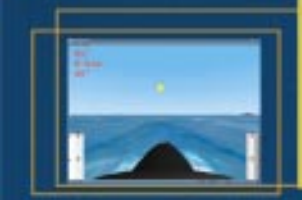

USER GUIDE

SubSkills NET 3.0

submarine skills-training network applications

DISTRIBUTED BY:

Submarine On Board Training

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SUBSKILLSNET V3.0 JUNE 2003

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1. INTRODUCTION

The Submarine Skills-training Network (SubSkillsNet) provides configurable training for individuals, sub-teams and teams. SubSkillsNet consists of an integrated system of simulations that meet a variety of training objectives (e.g. contact coordination, navigation, piloting, tactical plotting, navigation plotting, and sonar operation). This user manual explains network set-up and how to use SubSkillsNet products. These products can run networked together, or in stand-alone mode, to allow submarine team training capabilities on board and in schoolhouse training laboratories.

2. INSTALLING SUBSKILLSNET

The setup program starts automatically when the SubSkillsNet distribution CD is inserted (if Autorun is enabled.) Alternately, the setup program may be launched manually by double clicking on **<CD>:\setup.exe**. It is recommended that all defaults be selected during the setup process.

> ***NOTE:*** *SubSkillsNet 3.0 contains an interface to the Common Basic Operator Trainer (CBOT 8.5). CBOT is a separate product, produced by NUWC NPT, and is not included with the SubSkillsNet distribution. The classified version is a SOBT product (ICW-F-02009); the unclassified version is available from the NAVAIR ISEO at Groton, Norfolk, San Diego or Pearl Harbor.*

> ***Installation of CBOT:*** *An installation procedure is provided with CBOT. After CBOT is installed, it must be enabled in SubSkillsNet for it to be available to run with SubSkillsNet. To enable CBOT, run CHEAP Config from the* ***Start*** | ***Programs*** | ***SubSkillsNet*** *menu.*

The SubSkillsNet applications run on **Win98**, **WinNT4**, **WinXP** and **Win2000.**

The *typical* install includes the most often used SubSkillsNet capabilities and requires roughly 500 MB of free disk space. The following two applications are not installed in a typical installation because of their use in special environments. To install these applications, select “custom” during the installation process. This option allows selection of only those applications a user wants installed.

1) **PC Plots** is used to train Geo Plot, T/F, or ETB plotters. Bearings and frequencies are displayed and verbalized at appropriate time intervals. Some plotting labs are equipped with an interface to drive the ownship “bug” from a SubSkillsNet PC. For training in other settings, ownship track can be printed from PC Plots Control and taped under the plotting paper.

2) **CAT-Head** is an application that may be used in place of SurfCAT to provide a bridge view using a head-mounted display and head tracker. It is an experimental version at this time but is being used at one training site[1]. CAT-Head was developed and tested with the Daeyang E&C CyVisor DH-4400VP goggles and InterSense InterTrax2 head tracker. (This hardware cost about $2100 in July 2001.) There are three keyboard controls: **SPACEBAR** to turn binoculars on/off, **ENTER** to center view on bow centerline, and **TAB** to bring the view right side up.

Adobe Acrobat Reader is required to read the online SubSkillsNet documentation. If it is already installed on your system, there is no need to install the one included on the distribution disk.

[1]For further details on CAT-Head, please contact Dr Bob Ahlers at robert.ahlers@navy.mil.

3. A NOTE ON GRAPHICS CARDS

Hardware graphics acceleration is recommended for SurfCAT, SPOT, and CAThead. Visual effects such as dynamic ocean surface, textured landmass, detailed contact models and reduced visibility will not display correctly unless graphics acceleration is available. Most new computers, including laptops, support graphics acceleration. *However*, not all graphics acceleration hardware has drivers to support the SubSkillsNet requirements. In particular, the hardware must provide support for OpenGL.

> *Note: The appropriate video driver must also be installed; the hardware alone is not sufficient. The following video cards or chipsets have been found to be acceptable: TNT or TNT2, GeForce 2 and above Trident CyberBlade i7 AGP (8420-64), ATI RAGE M7.*

4. OPTIMIZING GRAPHICS

Visual applications in the SubSkillsNet family, such as SurfCAT and SPOT can display 3D terrain and scenarios with fog *if the required hardware and drivers are resident on the computers on which they are installed* (refer to Section 3). On slower, less capable computers, a performance decrement is noticeable when these applications are run. For this reason, SurfCAT and SPOT have menu items that allow certain graphics features to be turned *on* or *off*. SubSkillsNet 3.0 is shipped with Landmass (3D Terrain) *on* and both Alpha Blending and Fog *off*.

To configure 3D settings in SurfCAT or SPOT:

1. Open the Instructor Console (IC) by left clicking on the mortarboard icon ( ) found in the Windows task bar tray typically at the (right side) bottom of the screen. If no icon is present, go to **Start | Programs | SubSkillsNet | Instructor Console**.

2. Next, launch either SPOT or SurfCAT by clicking on the appropriate box under the Applications Tab. (For more detailed instructions on how to use the IC, please see **Section 8: Instructor Console**).

3. Select *View* | *Configure 3D Settings* from the menu bar. Figure 1 illustrates the options that may be selected to optimize system performance of the graphically intensive applications (SPOT, SurfCAT, and CAThead). The following settings can now be adjusted. You may have to proceed on a trial and error basis to find the proper mix of variables that work best, given your machine's capabilities.

Start by enabling **FPS** (Frames Per Second). The FPS display relays the update rate of the visual scene. This should be enabled initially so that you can see the effects of changing the other characteristics. The objective here is to maximize FPS; the higher the FPS rate, the smoother the scene will render in real time. Each of the five options has three states; but when configuring graphical optimization, use only *always on* or *always off*.

> *Note: Once the adjustment is made, it is necessary to exit the application. When you restart the application, the new settings will be in effect for both SPOT and SurfCAT on ONLY that computer.*

3D Terrain: This option determines whether or not landmasses are rendered. In extreme cases, disabling this feature may alleviate performance issues such as a lagging display and jerky motion, but bear in mind that only open ocean will be displayed.

Alpha Blend enables control over color transparency, such as those used in the bow wave. There is a perfor-

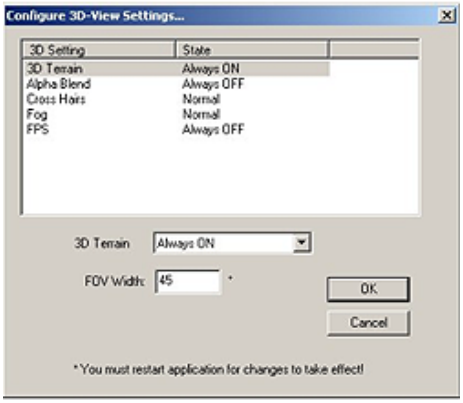

Figure 1. 3D Configuration Dialog

mance decrement when this is enabled on some computers.

Cross Hairs enables the display of the cross hair in SurfCAT, which indicates the bearing being sighted.

Fog: Some video drivers incorrectly report their level of OpenGL support. This results in problems with displaying some of the advanced visual effects, such as simulated fog. The best solution is to obtain a new set of video drivers from the manufacturer when they are available. If new drivers are not available or do not fix the problem, fog should be disabled. (This problem is common on the earlier model Panasonic CF48.)

FPS (Frames Per Second): When FPS is enabled, a display will be visible in the upper right hand corner of the window. This displays the number of polygons being drawn in each frame and the update rate in frames/second. The update rate is affected by the other parameters; try to maximize it.

> *Note: Enable this option* only *when setting the other parameters. It should be* off *during training.*

Field of View: The FOV parameter is the horizontal viewing angle subtended by SurfCAT. Reducing the FOV will increase the update rate. The default FOV for SurfCAT is 45 degrees.

5. VIEWING DATABASE OF VISUAL MODELS

The Contact Database Viewer is a browsing utility that allows a user to view each of the available visual models and access information associated with them (Figure 2). This information includes TypeID and SMMTT ID numbers as well as physical characteristics, such as dimensions, masthead height (for mastheads above 2 feet) and speed and acceleration capabilities. To open, go to **Start | Programs | SubSkillsNet | DBViewer**. The wheel control in the lower right corner controls the zoom; dragging the mouse within the view window controls the viewing angle. The text box on the right displays the contact's characteristics. The box on the left contains a list of all contacts in the database, although at present, not all contacts have 3D or acoustic models. For a list of available visual and acoustic models, please consult the SubSkillsNet Contact List (**Program Files | SubSkills Net | Docs**).

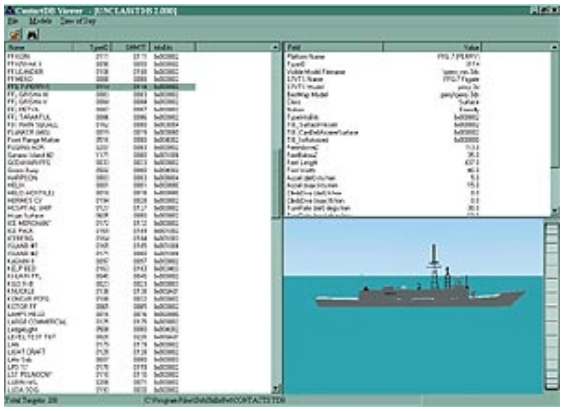

Figure 2. DB Viewer

6. SUBSCRIPT II

SubScript II is the scenario authoring and editing tool for use with SubSkillsNet products. With SubScript II, platforms can be quickly added or deleted to a scenario and orders can be graphically scripted. It also enables the user to add a gaming area and change the environmental variables. By allowing users to control a variety of parameters of the scenarios—such as contacts, orders, time, and environment—SubScript II gives the user a clear understanding of how a Scenario will unfold.

A limited set of visual models for navaids may be accessed in SubScript II for inclusion in scenarios. These models include red, green, and black ocean buoys; several lighthouses; front and rear range markers; and a generic factory and radio tower. The height of these navaids may be altered by providing a depth value for them in SubScript. These models should be used only in scenarios that do not access a gaming area. (Gaming areas are built in a separate application from a digital nautical chart CD.) Additionally, more than one hundred navaid models are gaming area specific, and are not available to SubScript.

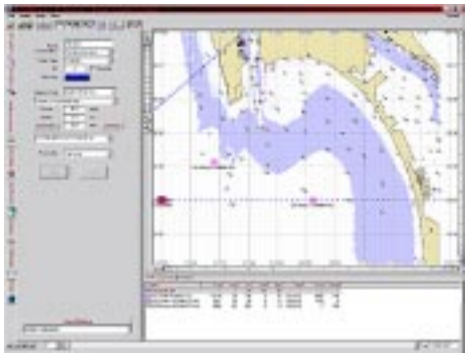

Figure 3. SubScript II

For a complete product description, including step by step instructions, please refer to the SubScript II User Guide.

7. NETWORKED VS STAND-ALONE TRAINING

Most products can run either as a stand-alone trainer or networked with other SubSkillsNet trainers (radar, fire control, bridge view, periscope, and others) to support team training. When individual products are networked with other trainers, they can be used to improve communication skills such as providing recommendations for maneuvers.

8. INSTRUCTOR CONSOLE

The Instructor Console (or **IC**; see Figure 4) is the primary interface of the SubSkillsNet training suite. It is the control panel that allows an instructor to set up and monitor dynamic exercises. Although the IC offers *some* run-time control, Run-Time SubScript (RTS) is designed strictly for on-the-fly platform control and situational updating. (For further details, please refer to **Section 9: Run Time SubScript**.)

Each of the SubSkillsNet training products operates on a PC (nominally a SOBT laptop) or on two or more networked PCs. A simulation server application plays a scenario, and it provides contact position and status to any number of client applications. Using the Instructor Console, training applications may be included in the network to provide, for example, periscope, radar, or bridge views of the scenario contacts. The Instructor Console computer controls target and ownship motion, as defined by scripted scenarios, or as directed in real time, for all of the applications.

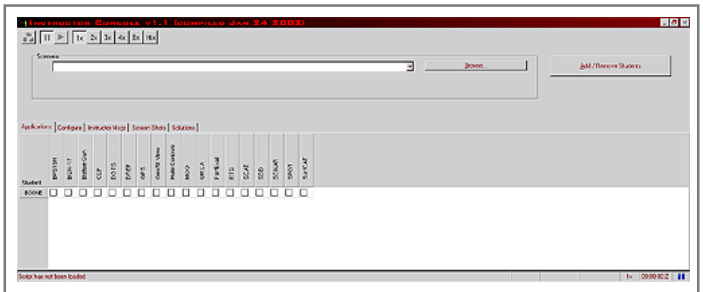

Figure 4. Instructor Console

8.1 Setting up the Computers for Networking

Networking *must* be set up on each computer that runs SubSkillsNet, regardless of whether one computer will be running alone or multiple computers will be running together. This *includes* the station that is running the Instructor Console. The Instructor Console is used to launch any of the SubSkillsNet products, and each computer to be networked must have a TCP/IP protocol set up. If TCP/IP is not set up, see your network administrator.

8.2 Conducting an Exercise

After the physical connections have been made and the network has been set up, start the Instructor Console and select the computers to be included in the training configuration. Select a scenario to be played, launch the desired training application(s), and start the scenario playing. The following sections provide procedures for these steps.

8.2.1 Starting the Instructor Console

To open the Instructor Console, left click on the mortarboard icon ( ) found in the Windows task bar tray typically at the lower right corner of the screen. If no icon is present, go to **Start | Programs | SubSkillsNet | Instructor Console**. This will launch the Instructor Console application and place the icon in the tray where it can be conveniently accessed.

8.2.2 Adding Students/Stations

The next step is to add student stations to the training session, if they have not yet been included.

At the Instructor Console, press the “Add/Remove Students” button to display the list of available stations. You’ll now be able to select the stations on the network that will participate in the training session (see Figure 4). Highlight the desired stations under the “Available” column on the left, and then click on the right arrow button. As you select student stations, their names will appear

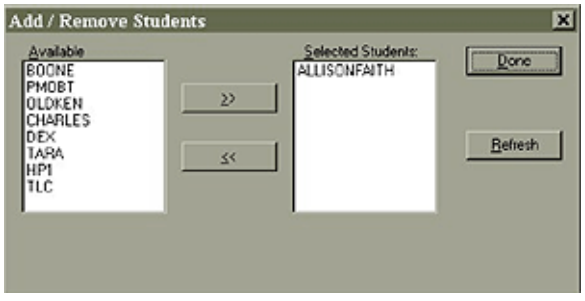

Figure 5. Add/Remove Students

in the right column. To confirm your choices and return to the Instructor Console, click the “Done” button. The station running the Instructor Console will appear at the top of the list. After the desired stations have been selected, a matrix under the Instructor Console’s Applications Tab will list networked stations (vertical column on the left) and all available applications (horizontal row)

represented by check boxes.

Notice that all applications may not be available on every workstation (this is most likely the result of not installing all applications on every student's station). the availability of a particular application is indicated by the presence of a checkbox corresponding to the workstation in question. If a checkbox for an application exists next to a particular workstation, then it can be run at that workstation.

8.2.3 Troubleshooting

If a desired station does not appear on the "Available" list, it may be because of the following:

a) The Instructor Console may not be running on it. Have the operator go to the station and check the task bar for the icon and, if missing, select it from the Start menu.

b) The Instructor Console is running, but the station has already been selected. It may have been selected by its own Instructor Console or another IC on the network. Have the operator deselect it.

Note: If a station still does not appear on the "Available" list, exit the Instructor Console on that station by right clicking on the tray icon and selecting Exit. Then, restart the Instructor Console from the Start menu. Then, on the Instructor Console, click the refresh button on the "Add/ Remove Students" dialog box to get a refreshed list of available workstations.

8.2.4 Launching Training Applications

Under the name of the training product you wish to launch, left click in the box in the row of the desired station. This will launch the training product on the selected station.

Multiple applications can be run on the same computer, limited only by its processing speed. Different applications can be run on each of the computers, or all of the computers can run the same application. The products available for training in a typical install are:

- **Bottom Gun** (game-based trainer for periscope operator skills)
- **BPS-15H** (radar)
- **BQN-17** (fathometer)
- **CAT-Head** (surfaced bridge view using a head mounted display)
- **CEP** (Contact Evaluation Plot)
- **ESGN** (Navigation Data)
- **GPS** (Global Positioning System)
- **Helm Controls** (controls speed, course, and depth of ownship)
- **MOO** (Manual Operator Override)
- **NMEA Interface** (National Marine Electronics Association) Interface to VMS
- **ORCA** (On-board Radar Collision Avoidance) trainer
- **PC Plots** (auditory reporting of contact bearing & frequency)
- **PerfEval** (scenario recording and playback utility)
- **RTS** (Run-Time SubScript, control of exercise as it plays)
- **SDD** (Ship's Data Display)
- **SONAR** (selected sonar displays)
- **SPOT** (Submarine Periscope Observation and Tracking) trainer
- **SurfCAT** (surfaced bridge view)

8.2.5 Selecting the Scenario to be Played

Scenario files are the situational scripts the simulator uses to govern the events, platforms and environment in a training session. Typically, each scenario contains a set of platforms along with a script that defines maneuvers/orders for each platform. These platforms may then interact in *gaming areas*—graphical environments with visual and physical features defined by geographical data (i.e. NIMA's DNC and DTED databases).

To search for scenarios, press the "Browse" button to bring up a standard Windows File Open dialog. (The path defaults to the directory containing the originally distributed scenarios. This is also the default path SubScript II uses to save Scenarios.) Once a scenario is selected, its file name will be displayed in the scenario window and directly below, a brief description of the scenario and the corresponding gaming area will appear (if any). A scenario may also be selected from the Scenario drop down list box in the Instructor Console. This list box contains the filenames of the most recent scenarios used. Please note that a scenario may take several seconds to load if it has a gaming area associated with it.

8.2.6 Playing the Scenario

Selecting a scenario does not automatically start playing it. The Scenario can be run at any time by clicking on the play button in the Instructor Console, but it may be advisable to wait until all desired training applications have been launched. The scenario may also be stopped, reset, or set to run faster than real time by using the appropriate buttons on either side of the play button.

8.2.7 Ownship in Scenarios

Any contact in a scenario may be designated as ownship through the Configure tab on the Instructor Console. However, only the 688I, 726, CG 47 (*Ticonderoga*), T-AH 19, FFG 7 (*Perry*), Supertanker and P3 Orion have bridge models. When other platforms are assigned as ownship, there is no bow or surrounding superstructure in the view.

9. RUN TIME SUBSCRIPT

Run Time SubScript (RTS) is the exercise control application that monitors target and ownship motion and environmental variables. With RTS you can control the events in the scenario as it is running. To use this tool, play a scenario, then choose RTS from the Instructor Console matrix.

9.1 Interface Overview

Upon startup, you may notice that the application layout is very similar to the old GeoSit capability (the original geographical display used for monitoring an exercise). However, RTS enables significantly greater user control over the scenario. These controls can be made visible by pressing the two right-most buttons on the toolbar (Figure 6) or the Helm Wheel icon for direct access to the Ownship control tab (Section 9.1.1).

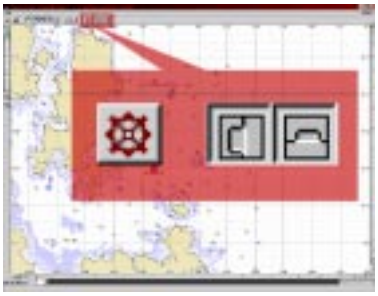

Figure 6. Ownship, Left-Side and Bottom Tab toggle buttons.

To toggle the Track History and the Speed Vector display for the contact icons in the GeoSit, click on the corresponding buttons to the left of the Helm Wheel icon (Figure 7). When enabled, track history will draw a dot along the path of the contact in the GeoSit at a rate of once per minute. The greater the speed, the wider the plotted intervals will appear along the contact's track.

Figure 7. Track History and Speed Vector toggle buttons.

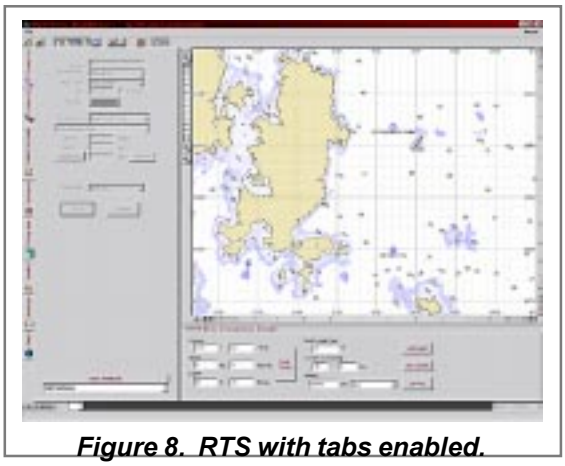

Figure 8. RTS with tabs enabled.

Select both tabs by clicking on them.

The main screen consists of display areas and user controls (Figure 8). Positioned on the right side of the screen is a geo-situational display (GeoSit) of a scenario. The vertical tabs on the left panel enable the user to control a scenario as it is playing (e.g., platforms, orders, environment). Additionally, the GeoSit tool box (located on the tool bar) allows an author to manipulate scenario characteristics, such as adding or removing navaids, editing water depth, and adding display environments, such as range rings.

Please note that RTS is *not* an authoring tool--you cannot save any changes that you make. To author Scenarios, use SubScript II (included in this release; refer to Section 6 of this User Guide).

9.1.1 Bottom Tabs

These tabs are located directly below the GeoSit view. Click on the tabs to access their respective features.

Ownship. Allows direct access to immediately affect course, speed and depth as well as environmental phenomena including depth under keel, current and visiblity. Additionally, you may set the rate of change for these parameters to take effect over time. For instance, visibility can be set for a rate of change of either 1,000 yards a minute or 5,000 yards a minute, simulating a 'rolling fog' effect.

Stats. Provides real time navigation data for the platforms in the scenario including values for range, bearing, course, speed and depth.

Console. Lists gaming area and scenario file status.

Over. Enables user to override individual platform characteristics. This permits the Instructor/Operator to add unplanned events. Click on the plus ("+") box next to the desired platform to expand the subcategories.

- **Casualties.** Simulates an impaired rudder and/or gyro failure. Also, a human 3D model is available to simulate a man overboard situation.

- **Overrides.** Use these features to simulate localized nautical anomalies, such as a change in ocean bottom depth (to provide "red" and "yellow" soundings) or an unexpected current shift.

- **Lights.** Toggles running lights on or off.

Model. Displays a 3-D thumbnail of the selected platform in the scenario. Click and drag within the window to rotate the model and view it from different angles.

9.1.2 Left Side Tabs

Contact List. Lists the active platforms in the scenario. To delete a platform, left-click to highlight then click the delete button.

Weather. This tab allows you to define environmental conditions. At present, visibility and sea state[2] have been implemented. (Future versions are slated to include wind

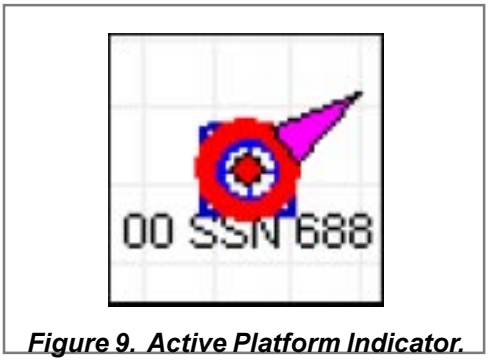

Figure 9. Active Platform Indicator.

[2]Although visible in BPS-15H, change of sea state is yet to be implemented in SSN's simulated visual environments (SPOT, SurfCAT). To change sea state for a 'clutter' return effect in BPS-15H, modify the Environment State Variable for sea state as you would for visibilty.

speed and direction, temperature of air and sea, cloud cover, and humidity.) To change the simulated visibility in a gaming environment, first click the "New Values" button. Then highlight "Visibility" in the Environment State window. Next, set desired visibility distance in yards, and press the visibility button to update to the new visibility condition. Click "OK" to save this change. The user may also select a time at which the defined visibility conditions will occur. The default time of implementation is the current time.

Event List. Displays a list of scripted events in chronological order. It is not possible to modify existing orders; however, you can delete those that are undesired and re-issue the replacement orders. As with the contact list, events may be deleted by left-clicking to highlight then clicking the delete button.

Messages. Utilized to script reminder messages.

Contact Composer. This feature allows you to modify and add platforms. Modifications to pre-existing platforms can only be made at the current time in the scenario. New platforms can either be made to appear at the current time or in the future. Changes made in Contact Composer take effect immediately (e.g., a depth change is instantaneous; a selected platform can be dragged to a new location). To issue orders or set waypoints, use the Manuevers tab described below.

To add a platform, click the New Platform button. The active platform that is being defined will be indicated by a red bull's-eye with an attached heading pointer (Figure 9). Next, you can determine classification, target type, ID number, course, speed, depth/altitude and location. When setting the platform's "Classification," the "Target Type" drop down menu adjusts for each class. Once a target type is chosen from the drop down menu the "Name" box reflects that choice and an ID number is chosen automatically. "Name" and "ID" can be manually adjusted if desired. To specify a time when the platform will enter the scenario, select Create at Scheduled Time from the dropdown menu and key in the desired time. You have the option to position the platform by LAT LONG, range and bearing from ownship or course-relative range and bearing. Use the apply button to implement the changes.

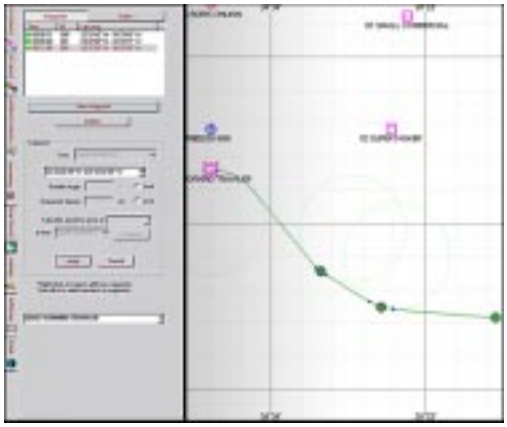

Figure 10. Setting Waypoints.

To modify a platform, select the platform from the stats tab, the GeoSit or the drop down menu below the New Platform button. Now you can change classification, target type, ID number, course, speed and keel depth/altitude. To have SubSkillsNet automatically bring the platform to proper simulation keel depth, click on the "Surfaced" button to the right of the depth/altitude field. For the platform's location, you can position by LAT LONG, range and bearing from ownship or course-relative range and bearing. Use the apply button to implement the changes.

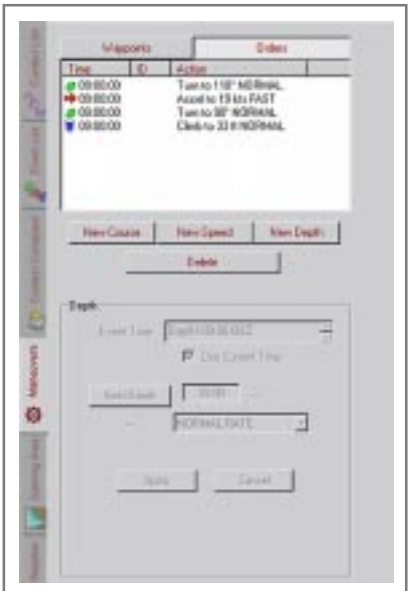

Figure 11. Scripting Orders.

Maneuvers. Use this tab to add and modify waypoints and orders. Left click on a platform in the GeoSit or select it from the stats panel below the GeoSit for orders or waypoints. Once a platform has been selected, a dashed square box will appear around that platform.

- **Waypoints.** Click the "Waypoints" button at the top of the "Maneuvers" tab (Figure 11). There are two methods to add a waypoint. Either click on the "New Waypoint" button and manually enter the information into the necessary fields, or right click in the GeoSit where a waypoint should be located. To move/modify a waypoint, left click on it and drag it around in the GeoSit or manually alter the LAT LONG values in the data field. Click "Apply" once the waypoint is positioned correctly.

  To delete a waypoint, highlight the waypoint in the display window and click the "Delete" button.

- **Orders.** Click the "Orders" button at the top of the "Maneuvers" tab. Select the platform from the dropdown menu at the base of the tab. To script a course change, click on the "New Course" button and enter the desired course and direction of turn of the platform. To script a speed change, click on the "New Speed" button and enter the desired speed and/or the acceleration rate of the platform. By clicking the "New Depth" button, depth and dive rate can be entered. After each new order, click on the "Apply" button, for it to be added to the list of orders in the task window (refer to Figure 11). You can schedule the order to execute in the present or in the future. If you want an order to take effect immediately, then click the "Use current time" box.

Setup. The time of day selected affects ambient light level (e.g. morning, mid-day, night) and sun and star positions. Time of day may be selected in several ways. Local time or GMT may be entered maually. For local time, use the dropdown menu to select time zone and set desired initial time of day. (Local time of day is specific to the real world location that the gaming area corresponds to.)

Gaming Area. Lists gaming area stats. Click and drag the green box to change your overhead view of the scenario.

10. HELM CONTROLS

Helm Controls allows the student to adjust the course, speed, and depth of ownship. To adjust any of these orders, click on the corresponding button and enter a value in the pop-up calculator, via mouse or key entry. The user can also manually change engine order, rudder control, and repeater compass by moving the dial found on the display.

For a less graphically realistic, more straightforward interface, click on the **SIMPLE VIEW** button, located in the upper right hand corner of the helm unit (see Figure 12).

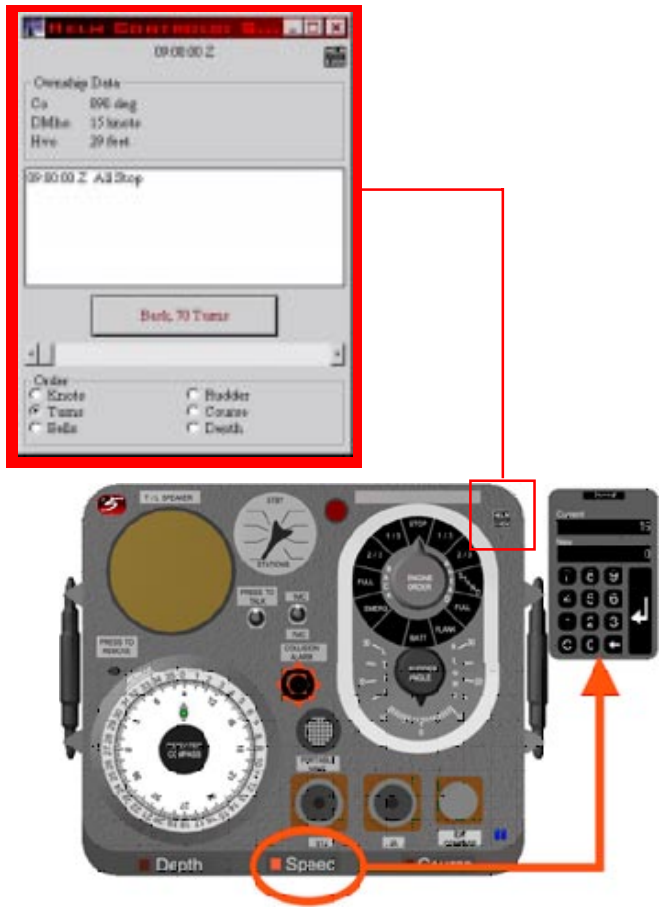

Figure 12. Helm Controls (with Speed Pop-Up Calculator and Simple View Enabled)

11. MOO

The Manual Operator Override (MOO, Figure 13) application can be used to synchronize one or more SubSkillsNet training products with an external simulation running in a team trainer (in the absence of a software interface between the two simulations). MOO can also allow a user to position or reposition any platform in a SubSkillsNet scenario while that scenario is loaded. The position of each platform relative to a position reference (which must be another platform) is continuously displayed as range and true bearing, along with its course, speed, and depth.

A list of all platforms available in the scenario can be found under **File|Select Platforms**. Highlight the ones that are to be controlled and click **OK**. (If ownship is to be positioned relative to a platform, do **not** select that platform.) By default, all selected platforms are referenced to ownship. This reference to ownship may be changed by clicking on the arrow button on the right side of a Reference field and selecting the platform that will be the new reference. To change a bearing, range, course, speed, or depth value, click on it and type in a new value. The change will be made effective when the cursor is clicked outside of the current cell or if the **Enter** key is pressed. A change to bearing or range will be effective immediately. A change to course, speed, or depth may be either immediate or acted upon as an order, depending on the state of the **Options|Course, Speed, Depth Changes are Ordered, not Instantaneous** menu item.

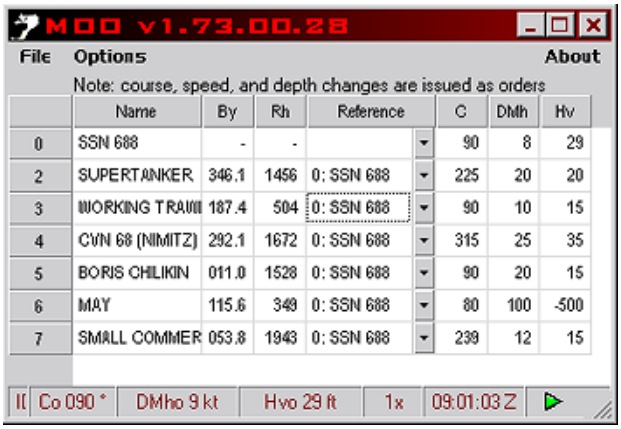

Figure 13. MOO Interface.

> ***Note:*** *The order of the platform list may be changed, and platforms deleted, by right clicking on a platform's name and selecting an option from the popup menu.*

12. SurfCAT

Surfaced Collision Avoidance Trainer (SurfCAT) allows novice OODs and Contact Coordinators to practice making maneuvering decisions in open ocean situations (see Figure 14). It is a simulation of a surfaced submarine bridge view in which users may visually track moving contacts by scanning the area around ownship. The system may be used to provide training in the identification of contact type, as well as estimation of contact range, true and relative bearing, course, speed, and angle on the bow. In addition, it can be used in conjunction with the Attack Centers and the SPAN trainers at submarine training facilities to incorporate crew members who might otherwise not be able to practice with their team.

12.1 Special Features: Joystick Support

A version of SurfCAT that uses a joystick for elevation and azimuth control (azimuth can also be changed using mouse wheel), and a button for binocular view, is included in the installation. It requires DirectX 8.x and *absolutely will not run* under NT. Installation of DirectX 8.x is provided on the distribution CD. To enable the joystick version of SurfCAT, go to the SubSkillsNet directory (Program Files|SubSkillsNet|Bin) and first rename the original ***surfcat.exe*** to something else; this enables it to be used later by renaming it back to ***surfcat.exe*** rather than reinstalling it. Next, rename ***joysurfcat.exe*** to ***surfcat.exe***. Make sure the joystick is installed and calibrated properly according to manufacturer's instructions.

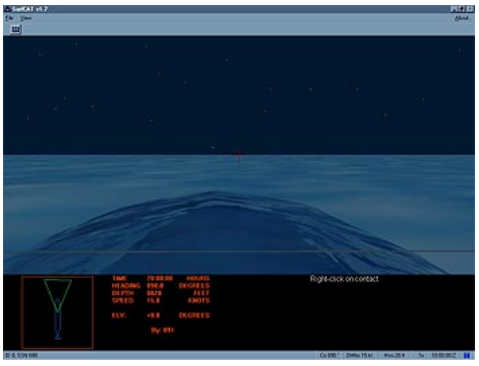

Figure 14. SurfCAT

13. SPOT

The Submarine Periscope Observation and Tracking (SPOT) trainer is a periscope observation skills trainer. Scripted scenarios allow users to visually track contacts through a simulated Type-18 periscope view (Figure 15). The system may be used to provide training in the identification of contact type, as well as in estimation of contact range, true and relative bearing, course, speed, and angle on the bow.

Users may select contacts by right-clicking and will be queried to enter a victor number into a dialog box.

13.1 Special Features

There are three ways to change the direction of view in SPOT. One is to move the green triangle in the upper left corner to the desired direction of view. The second way is to press the left mouse button and drag the mouse in the periscope view in the appropriate direction. Finally, in the periscope view, the azimuth can be changed by using a mouse wheel.

To change the field of view (and the magnification), use the magnification buttons on the toolbar. SPOT's magnification factor can be set for 1.5X, 3X, 6X, 12X and 24X.

As with SurfCAT, SPOT also supports use of a joystick. Following the same procedure as outlined in Section 12.1, save a backup of ***spot.exe*** from the SubSkillsNet BIN directory. Next, rename ***joyspot.exe*** to ***spot.exe***.

For comprehensive guidance on setting the parameters found in the View menu, please refer to **Section 4**.

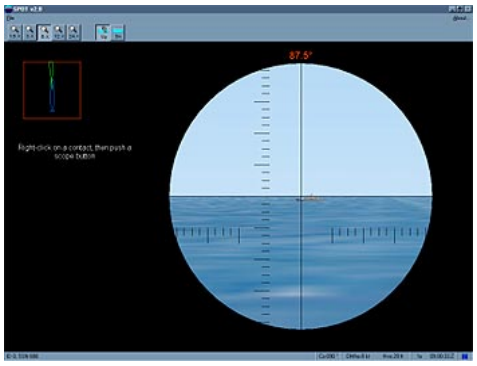

Figure 15. SPOT

14. CBOT INTERFACE

SubSkillsNet's CBOT interface resides on the Instructor Console. There, you will find three tabs, marked "CHEAP," "Sensors " and "Contacts."

The Instructor Console supports multiple ownships, but tracker data from only one ownship is sent to CBOT via the CHEAP tab. The instructor must designate which ownship to use by selecting from the dropdown (typically 0).

The "Sensors" tab is used to deploy and retract up to two arrays, simulating a variety of array types (e.g., TB-16, TB-23, or TB-29). Other operator determined variables include *Cable Scope* (length of cable from the towing eye to the nose cone of the array) and *Array Length* (length of the array from nose cone to aft end). Though these values vary according to what type of array is selected, the instructor can ultimately deploy an array with any non-zero value for the scope and array length. Also, in the "Sensors" tab is a box that displays information on both towed arrays, whether retracted or deployed. When deployed, it shows array type, length of towing point on ownship to end of array, stability of array (stable/unstable), and heading of the nose cone.

The "Contacts" tab is used to assign a contact to track. Contacts may be added, updated, or removed by pressing the appropriate button. When adding a contact to track, the following information must be specified: sonar system, tracker ID, array type, propagation path, manual or ATF, and if applicable, frequency. This information will then be displayed at the bottom of the "Contacts" tab. Another way to add a contact is to pickle a bearing on a contact in the SubSkillsNet periscope simulator. To remove a contact, first select it in this lower window and then click on "Remove Contact." The contact information is automatically sent to CBOT as contacts are added, updated, or removed.

For more detailed instructions on how to use CBOT, refer to the CBOT User Manual on the CBOT CD.

14.1 Launching CBOT

With CBOT enabled, click the CHEAP tab on the Instructor Console. From the Configuration pull-down menu, select CBOT BLOCK 1C to launch the application.

15. SONAR

The SONAR application simulates a Spherical Passive Broadband Array SONAR display. SubSkillsNet's SONAR emulation enables a sonar user to direct target information to Fire Control during a training exercise.

15.1 The Sonar Display Window

The primary components of the SONAR display are the waterfall and a column of tracker cells. Above the waterfall display are tick marks bearing the cardinal directions. Also present is the bow marker, represented by a "V." A faint line 180º relative to the bow marker serves as a stern marker (Figure 16).

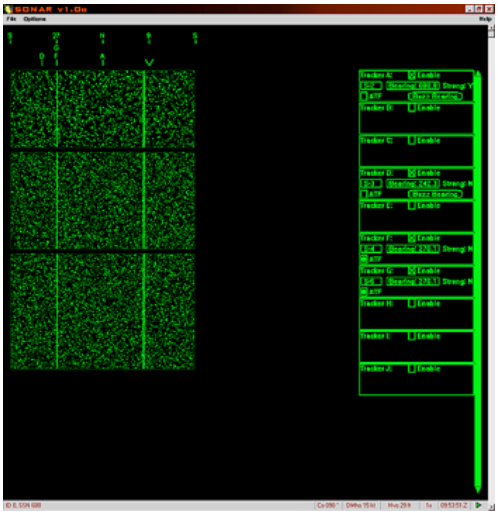

Figure 16. Sonar Application Window

The sonar trackers may be enabled or non-enabled. Both states are represented in Figure 17. When enabled by a checkbox, each tracker cell displays information and options such as designation, bearing, return strength, automatic target follow (ATF) on or off, and buzz bearing.

To begin tracking, first enable a tracker. A designator icon corresponding to the tracker ID ("D," for example) will then appear on top of the waterfall display, below the directional ticks. Drag the icon over the DIMUS trace you wish to track and click ***Buzz Bearing*** to send a bearing data point to the fire control system. Alternately, click ATF to automatically track the contact and send data to fire control continuously.

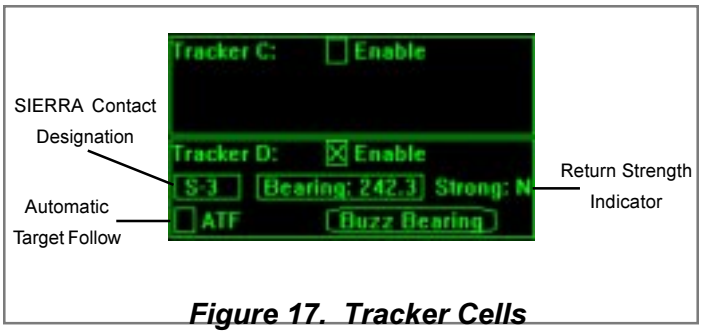

Figure 17. Tracker Cells

15.2 Monitoring and Modifying Contact Data

To access the control variables and a contact list for tracked platforms in the scenario, click on the ***Contacts*** tab in the IC.

This tab displays a breakdown of the contacts tracked, the time elapsed since initial contact (Age), the sensor array type, the propagation path and so on. Notice that if ATF was enabled when tracking a contact, information is constantly being transmitted and updated.

To alter the range of a contact, open the Contact Range dialog panel by clicking on ***Options*** | ***Tune Contacts*** Figure 18)**.** Select the desired contact by clicking on it in the displayed list. Enter a new value in the **Change Max Detection Range to** field and click **Apply** to update the range. Click **OK** to exit.

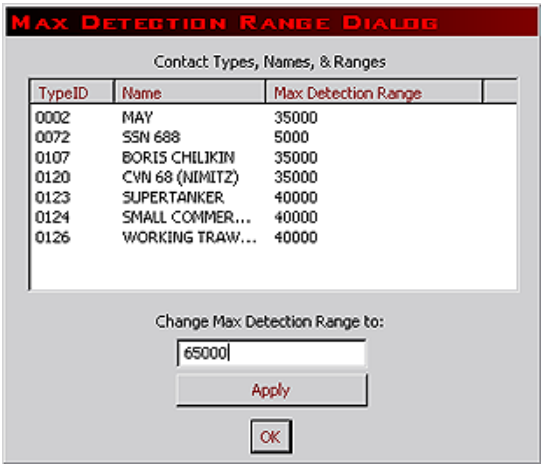

Figure 18. Max Detection Range Dialog

16. CEP: CONTACT EVALUATION PLOT

The CEP (see Figure 19) represents the bearing data the contact evaluation plotter would annotate on the plot. Tracked contacts from SONAR or SPOT form a plot on a grid consisting of bearing versus time (x vs. y). To change the time interval represented in the CEP, click on the desired button in the upper left-hand corner: 02, 05 or 10 minutes. To display 2° grid lines, click on the green and yellow grid button to the left of the time controls. Also, to view the older plotted data in the CEP, move the slider bar. The slider bar does not activate until the window fills up with potted data.

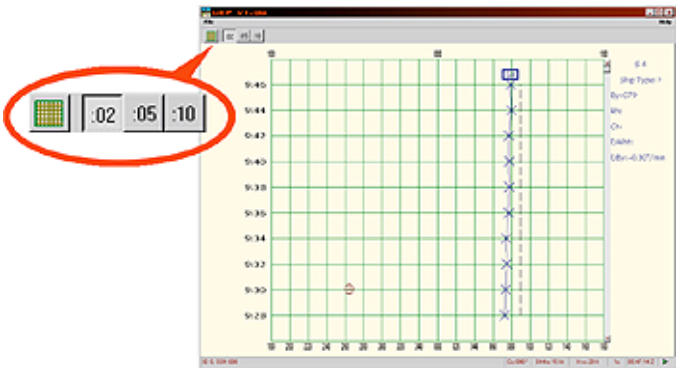

Figure 19. CEP Controls

In addition to being color coded, each plot is headed by the contact designation type code in a box, e.g. S-4 or V-7. Ownship is represented by a black line; solid for submerged and dashed for surfaced. To view the bearing rate of a leg, make sure the plot is at its most recent (or uppermost) time mark, using the slider bar if necessary. Click your mouse on the head of the plotted contact, in the boxed area containing the contact name (S-4, for example). The bearing rate for that leg will display on the right hand side. The number will appear under the CEP and be color-coded to correspond to the line to which it refers.

Note: If multiple plots share the same bearing, CEP will stack them one on top of the other.

17. BPS-15H

The latest BPS-15H simulation (Figure 20) incorporates new features such as: Data Logging, PAD Vectors, Trial Maneuvers, Clutter, Improved Target Returns, Manual Plotting, and Landmass. Navlines have not yet been implemented but is a planned addition for a future release (to be determined). Those functions that are implemented have white button labels; those not implemented have background color labels.

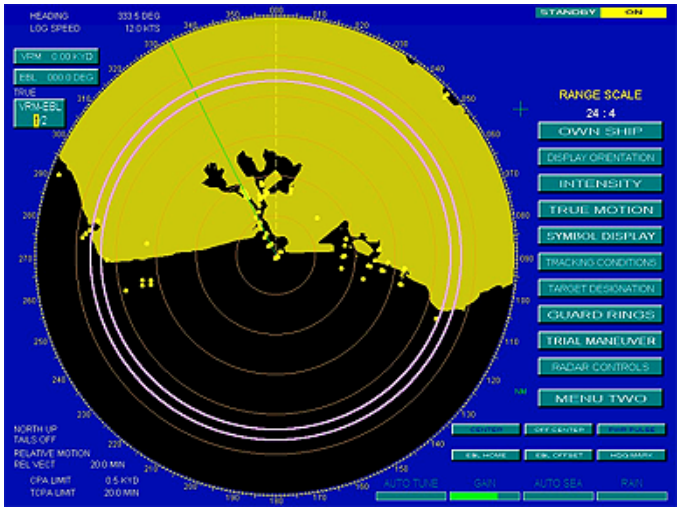

Figure 20. Display of BPS-15H

18. ORCA

On-board Radar Collision Avoidance (ORCA) trainer offers the user practice in contact management skills (e.g., determining CPA) on the SPA-25E (refer to Figure 21). It consists of a radar repeater simulation with a dynamic sweep and interactive controls. Controls include range and bearing cursors, range rings, range selector, and strobe cursor. In addition, a simulated grease pencil can be used to plot contact positions, project the track, and translate predicted positions down the track. The radar repeater functions can then be used to determine CPA parameters, which can be entered into the system to measure user performance. Fifteen dynamic contacts can be tracked concurrently.

Figure 21. ORCA

19. BQN-17

The BQN-17 fathometer trainer enables a user to set up and use the BQN-17 fathometer in various modes. The objective of this product is to develop an operator's skill in reading ocean depths in several different modes. These modes are shallow, shallow expanded, deep, and contour. During the recording session, the history of the recorder window can be viewed at anytime. Also, histories can be saved and viewed at a later time.

Figure 22. BQN-17 Display

20. GPS

The Global Positioning System (GPS) Simulation provides practice in the Initialization and Navigation modes of AN/WRN-6(V) Shipboard Navigation Sets (see Figure 23). The system may be used to provide training in the monitoring and editing of destination and waypoint information. Refer to the GPS user manual for further assistance on how to use this trainer.

Figure 23. GPS Display

21. PERFEVAL

PerfEval is a part of the SubSkillsNet (SSN) family of applications. It allows recording and playback of SSN scenario data through the Instructor Console (IC) for viewing concurrently with the exercise or for later review. Using PerfEval, the instructor and/or student may view exactly what happened during a training scenario.

PerfEval operates in two modes: **Connected** (to the IC), and **Disconnected**. When PerfEval is **Connected**, it operates like any standard SubSkillsNet program, obeying the IC's commands to play, pause, change time running rate, etc. Therefore, when **Connected**, PerfEval displays what is currently transpiring in the scenario. When **Disconnected**, PerfEval displays dials at the bottom of the screen that allow the user to manipulate time, updating its displays to show data from a selected time in the exercise. PerfEval is organized into several sub-applications accessible as horizontal tabs which are lined up at the top of the main display window.

For a comprehensive look at PerfEval's capabilities, please refer to the PerfEval User Guide.

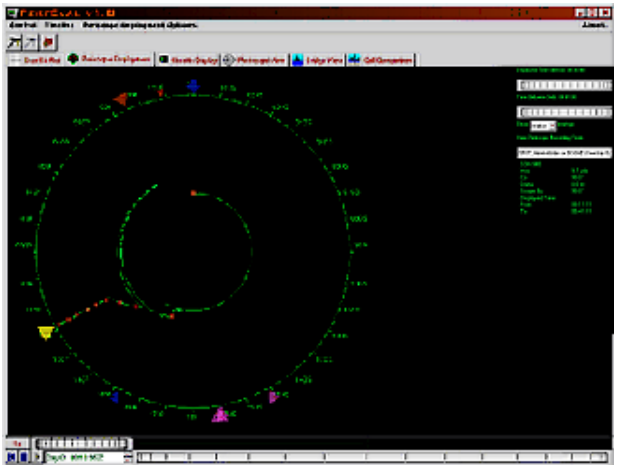

Figure 24. PerfEval (with Periscope Employment Tab enabled)

22. NMEA INTERFACE

The NMEA Interface application transmits National Marine Electronics Association (NMEA) formatted messages over a serial line or through a virtual port. The messages are created from data generated by a SubScript scenario. This allows other applications that accept NMEA 0183 messages to receive real-time simulation updates for both ownship and contacts. This interface has been tested with the NIMA FUND application and ECDIS-N systems from Litton Marine (Voyage Management System Version 6.2) and Offshore Systems Ltd. (ECPINS 4).

For more technical details on this product, including assistance on configuring VMS devices, please refer to NMEA User Notes (located in the SubSkillsNet directory, in the Docs folder).

23. ESGN

The ESGN simulates the display from an Electronically Suspended Gyro Navigation system (see Figure 25). It provides the following information on ownship: latitude, longitude, heading, speed, and velocities (both north and east). With the exception of Error Control, there is no direct manipulation or change of this display by the user; changes made using other trainers (e.g. MOO, RTS, Helm Controls) will be reflected in ESGN.

Figure 25. ESGN

Error Control (Figure 26, found under **Options**) simulates an Inertial Navigation System (INS) error based on the Schuler Oscillation. When this option is exercised, a dialogue box will prompt you to enter user variables in order to calculate the magnitude of error. Both parameters must be set to non-zero values in order for the oscillation to be valid and the error to be applied.

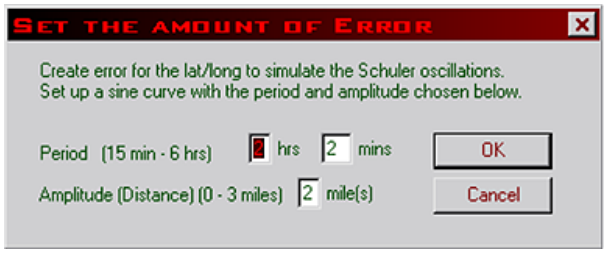

Figure 26. Schuler Oscillation Error Dialog Box

24. SDD

The Ship's Data Display (SDD) simulates ownship SDD by relaying information such as time (within the scenario), course, speed, and depth of ownship. It also displays the bearing output from both #1 and #2 scopes. This display receives its data from the simulation and from periscope student station inputs.

Figure 27. Ship's Data Display

25. BOTTOM GUN

Bottom Gun is a training game designed as an enjoyable and educational way to practice calling periscope contacts' divisions and angle-on-the-bow (AOB). Bottom Gun (Figure 28) simulates the view through a Type-18 periscope. Since Bottom Gun uses dynamic views, the player can scan and assess an evolving traffic (or tactical) situation in order to determine other ships' range and AOB. Using these estimates, the level of collision threat (i.e., coming too close to own ship) is ascertained. If a ship is determined to be a safety threat, the player can then choose to fire missiles and sink that ship.

For a complete overview of this game, refer to the Bottom Gun User Manual. (This product is currently undergoing significant upgrades in its capbilities and appearance.)

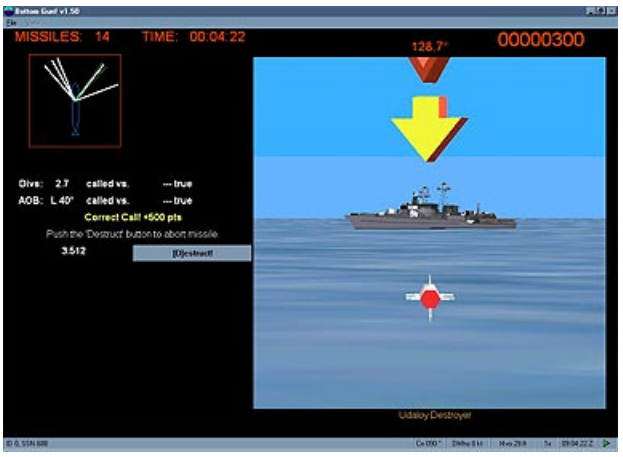

Figure 28. Bottom Gun

26. CAT-HEAD

CAT-Head offers a bridge view through the use of a head-mounted display and head tracker with a motion sensor. It allows novice OODs and Contact Coordinators to practice making maneuvering decisions in open ocean situations. This product is similar to SurfCAT except CAT-Head uses a head-mounted display that allows the user to visually track moving contacts using head movements. On the display, the following information is provided: ownship course, speed, and true bearing.

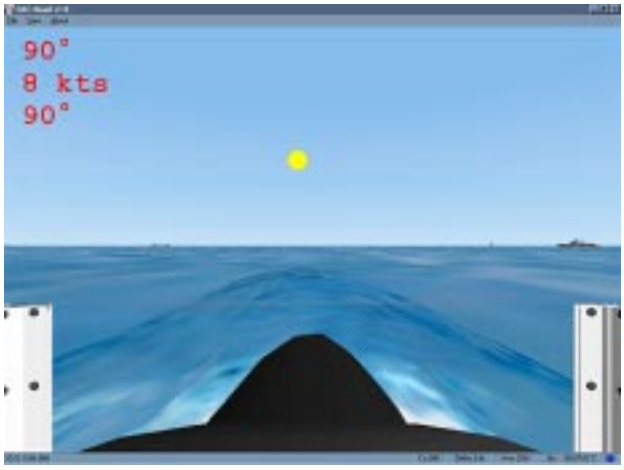

Figure 29. CAT-Head view

There are three keyboard controls: **SPACEBAR, ENTER,** and **TAB**.

SPACEBAR toggles the binoculars on and off.

ENTER re-centers the view on bow centerline.

TAB brings the view right-side up.

Note: CAT-Head is an experimental version at this time, which is in current use at one submarine training site.

27. PC PLOTS

PC Plots was developed to eliminate the need to author new SORAT scenario tapes to be used for training Extended Time Bearing (ETB), Geo and Time Frequency (TF) plotting in the tactical plotting laboratories. It allows an instructor to construct new scenarios very quickly, by using SubScript II. Using PC Plots, students can listen to the auditory reports of bearings, faired bearings, and frequencies related to tracked contacts to obtain the data needed to plot on the Geo, TF, or ETB plots. In addition, a Data Display Unit (DDU) is simulated (Figure 30).

PC Plots has two modes for Geo Plotting. The first is a plotting lab with dynamic “bug”: PC Plots may be connected to the MK19 Mod19 plotter table via an interface box available in some plotting labs in order to dynamically drive the bug on each of the plotting tables. The second mode is a plotting lab on-board with no dynamic “bug”: When the “bug” cannot be driven, paper plots may be printed and secured under the potting paper to represent the ownship track.

Refer to PC Plots User Manual for complete instruction on this trainer.

Figure 30. PC Plots

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